

REMARKS/ARGUMENTS

The claims are 1-16. Claims 1, 3, 4, 7, 10 and 12-16 have been amended to more clearly define the invention. Support for the claims may be found, *inter alia*, in the disclosure at paragraphs 2, 11, 12, 25 and FIG. 2. Reconsideration is respectfully requested.

Claims 1-7 and 10-16 were rejected under 35 U.S.C. § 102(a) as being anticipated by the prior art shown in FIG. 1 of Applicants' disclosure. Claims 1-16 were rejected under 35 U.S.C. § 102(a) as being anticipated by Huang et al. U.S. Patent No. 6,147,844.

Essentially, the Examiner's position was that the prior art shown in FIG. 1 represents a superconducting magnet electric circuit as recited in Applicants' claims including a plurality of spatially separated main magnet coil portions (12, 14) connected in series to form at least one main coil series circuit and a plurality of spatially separated secondary magnet coil portions (16, 18) connected in series to form at least one secondary coil series circuit.

The Examiner has also taken the position that Huang et al. shows a similar circuit including a plurality of spatially separated main magnet coil portions (19, 9) connected in series to form at least one main coil series circuit and a plurality of spatially separated secondary magnet coil portions (8, 18) connected in series to form at least one secondary coil series circuit.

This rejection is respectfully traversed.

As set forth in independent claims 1, 7, 12, 13, 14, 15 and 16, as amended, Applicants' invention provides a balanced quench protection circuit which protects its superconductive assemblage from damage during a quench. As shown in Fig. 2, the circuit includes a superconducting coil assemblage having a plurality of spatially separated and geometrically symmetric main magnet coil portions connected in series to form at least one main coil series circuit and a plurality of spatially separated and geometrically symmetric secondary magnet coil portions connected in series to form at least one secondary coil series circuit. In this way, as discussed, for example, at paragraphs 12 and 25 of the specification, when a quench occurs, the current flow through the coil (main or bucking) that initiated the quench will be the same as the symmetric (main or bucking) coil with respect to the

mid-plane because they are connected in the same sub-circuit.

Although currents in different sub-circuits may be different, the symmetry or current balance is preserved in terms of the current in the two half magnets. Therefore, the interactive force, that is the force acting on each half structure and/or the main and bucking structures, will be minimized, resulting in a balanced quench.

Neither the prior art shown in FIG. 1 nor the Huang et al. patent shows the structure of Applicants' superconducting magnet electrical circuit as recited in the claims, nor teaches the balanced quench protection resulting from that structure.

Contrary to the Examiner's position, it is respectfully submitted that FIG. 1 does not show a main coil series circuit and a secondary coil series circuit. Instead, FIG. 1 simply shows a first main coil and bucking coil circuit and a second main coil and bucking coil circuit symmetric with respect to a symmetry midplane. As discussed at paragraph 10 of the specification, in this circuit, the current in different coils geometrically symmetric to the mid-plane may not decay at exactly the same rate, thereby inducing a net differential force acting on the coils which results in an unbalanced quench.

Similarly, Huang et al. also fails to show a main coil series circuit and a secondary coil series circuit as recited in Applicants' claims. In this connection, it should be noted that coils (0, 10) are not secondary coils as stated by the Examiner but, rather, are main magnet coils. See Column 3, line 9 of Huang et al. There is no disclosure or suggestion of Applicants' balanced quench protection circuit as recited in the claims.

Moreover, none of the coils in Huang et al. that are grouped together in the same sub-circuit are symmetric with respect to the midplane. For example, as shown in Fig. 1 of Huang et al., coils 16, 17 are main coils grouped together in the same sub-circuit but are not geometrically symmetric to the mid-plane. Similarly, coils 18, 19 are main coils grouped together in a same sub circuit but are not geometrically symmetric to the mid plane. The same is true for coils 8, 9 and coils 6, 7.

In addition, as shown in Fig. 2 of Huang et al., coils 9 and 19 do not belong to the same sub-circuit. They are separated by a line (not numbered) in between the coils, and therefore these coils will not be guaranteed to have the same current during a quench, resulting in an unbalanced quench. The same is true for coils 8 and 18. In contrast to these coils which were specifically noted by the Examiner, in Applicants'

superconducting magnet electrical circuit the main magnet coil portions are grouped together in a sub-circuit, and the secondary magnet coil portions are likewise grouped together in a separate sub circuit, and each sub-circuit will have the same current during a quench.

In summary, claims 1, 3, 4, 7, 10, and 12-16 have been amended. In view of the foregoing, it is respectfully requested that the claims be allowed and that this case be passed to issue.

Respectfully submitted,  
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